

Prevalence and Awareness of Varicose Veins in Saudi Arabia, A Cross-Sectional Study

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ABSTRACT

Background: Varicose veins is the most reported medical condition which considerably increases patient morbidity and cost over time. The goal of this study was to establish the prevalence, perceptions, and familiarity of varicose veins in Saudi Arabia.

Material and methods: A total of 916 participants met our inclusion criteria—i) at least 20 years of age, ii) residing in Saudi Arabia, and iii) not pregnant— and were selected for this cross-sectional Study conducted in 2023. A three-part validated questionnaire was used to collect participants' demographics, medical history, work-related information, and questions to assess their level of knowledge about varicose veins.

Results: The commonly recognized risk factors of varicose veins were prolonged standing (84.8%) and being overweight (84.6%). Leg pain or heaviness (74.8%), and discomfort while walking (74.1%), were the most well-known symptoms of varicose veins. Participants above the age of 60 had a statistically significant greater prevalence of varicose veins ($P<0.001$). Participants who worked more than 8 hours per day had a prevalence of 11.3%, compared to 3.5% of those who worked less than 4 hours per day ($P=0.018$). Furthermore, a significantly higher prevalence of varicose veins was seen among participants with more than 4 hours of standing at work ($P<0.001$).

Conclusion: Our study population had a fair understanding and awareness of varicose veins. However, the prevalence of varicose veins was significantly greater among people with jobs that required long hours of standing and working. Careful attention to improving working conditions for the population at risk is required to decrease the prevalence of varicose veins.

INTRODUCTION

Varicose veins (VVs) are the most prevalent type of vascular disease and the most frequently reported medical issue that significantly increases patient morbidity and cost over time¹⁻⁵. Veins have valves that help the blood return gradually to the heart without leaking blood. When these valves become weak, blood and fluid collect and pool, pressing against the walls of the veins and causing VVs⁴. VVs are defined as palpable, dilated, frequently tortuous subcutaneous veins, most commonly affecting the lower limbs and involving the great and small saphenous veins, saphenous tributaries, and other superficial leg veins⁶. The prevalence of VVs is estimated to range between 20% and 60% globally, with up to 30% in the Western world, while the incidence is higher in the Asian region⁷⁻⁹. In Saudi Arabia, the prevalence is as high as 62%, with an annual increase of roughly 5% for females and 2% for males^{10,11}.

VVs are known to be an early sign of chronic venous insufficiency (CVI), which is asymptomatic or causes only mild symptoms at first, including aching, heaviness in the lower legs, fatigue, swelling, restlessness, pins and needles, a burning sensation, tenderness, and spasms that progressively worsen and may significantly impact quality of life¹². Over time, and in severe cases, the veins may rupture, leading to serious complications, such as thrombophlebitis, lipodermatosclerosis, abnormal skin pigmentation, induration, and ulceration¹³⁻¹⁶. Several risk factors have been associated with the development and exacerbation of VVs, including increasing age, female gender, pregnancy and parity, family history, prolonged standing, body mass index (BMI)

and obesity, and genetic factors¹⁷. One of the main factors identified as contributing to VVs is working in an occupation that requires extended standing, such as teaching, security guards, nursing, retail sales, messengers, traffic police, food service, and many manufacturing jobs [18]. Prolonged standing is fundamentally linked to a higher risk of VVs, with a probable limit of > 3–4 h/day. Research has found that individuals in such careers are likelier to develop varicosity¹⁹⁻²³. Avoiding prolonged standing, weight loss, exercise, intermittent leg elevation, and wearing compression stockings may all be helpful in preventing the development and progression of VVs²⁴.

Previous studies have noted a lack of knowledge and awareness regarding VVs and CVI risk factors and symptoms, even in patients with VVs²⁵. A previous study in Poland showed that only 37.31% of men understood what CVI is²⁶. Another study in the Western region of Saudi Arabia reported that fewer than one-third of the population was aware of VV symptoms; only 25.8% recognized swelling in the ankle and foot as a common symptom of VVs, and only 22.9% mentioned heaviness in the legs²⁷. Similarly, a recent study conducted in Korea concluded that the majority of their respondents knew only that CVI is a disease, and there was limited public knowledge of the condition²⁸. A lack of understanding and awareness of this condition, including its early symptoms and risk factors, acts as a barrier to addressing the problem early and preventing its complications. The purpose of this study was to determine the prevalence of VVs among the Saudi Arabia population and to measure their perceptions of and familiarity with VVs.

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MATERIAL AND METHODS

Between March and May 2023, this cross-sectional survey, using a structured self-administered questionnaire, was carried out among Saudi Arabia’s population. Participants were recruited via social media websites, Twitter and WhatsApp groups, and online invitations to examine the prevalence of VVs among the Saudi Arabian population and to assess the extent of their knowledge about VVs. The recommended sample size was calculated using Raosoft’s online tool. A minimum of 385 individuals would be required to achieve a 95% confidence level with a 5% margin of error. A total of 952 individuals across various regions of Saudi Arabia volunteered to take part in the study after being informed of its goals and the anonymity of their responses. Of them, 916 participants met our inclusion criteria—i) at least 20 years of age, ii) residing in Saudi Arabia, and iii) not pregnant—and were selected for this study. The Biomedical Ethics Unit of the College of Medicine, King Abdulaziz University, Saudi Arabia, reviewed and approved the study protocol and instrument (Ref:132-23).

A three-part questionnaire was created using two previously validated questionnaires that had been used in research evaluating the prevalence of VVs among 366 nurses in Riyadh, Saudi Arabia, and VV awareness among 50 dentistry students in Tamil Nadu, India²⁷⁻²⁹. We gathered additional information from Saudi Arabia’s Ministry of Health (MOH) regarding symptoms, complications, risk factors, and preventive strategies for VVs³⁰. The questionnaire was translated from English into Arabic and then reviewed and approved by consultants and experts who affirmed the tool’s reliability and validity. A pilot study was carried out with permission from the relevant authorities.

The first part of the questionnaire consisted of demographic and behavioral information, such as age, gender, weight, height, nationality, region, occupation, medical history, smoking status, and exercise. The second part included work-related information, such as the number of hours spent at work and the number of hours standing. The third part provided information about VVs, such as whether the participants had a previous diagnosis of VVs or whether there was a family history of VVs. Other questions were added to assess their level of knowledge about VV risk factors, symptoms, complications, and preventive measures. Once completed, the questionnaire was written in English and Arabic using online Google Forms and filled out by the participants.

All participant responses collected were entered in Microsoft Excel 2016 (Microsoft Corporation, Redmond, WA, USA) and analyzed using SPSS Statistics software, version 21 (IBM Corp., Armonk, NY, USA). The non-numerical variables were reported as numbers and percentages, and compared using the chi-square test, and numerical variables were presented as mean and standard deviation (SD), and compared using the independent t-test. In all tests, a *P*-value of 0.05 was considered statistically significant.

RESULTS

Participants’ knowledge about VVs: The baseline demographics and characteristics of the study participants are detailed in Table 1.

Table 1: Baseline demographics and characteristics of study participants

Overall (n=916)	Characteristics
<i>Gender, n (%)</i>	
622 (67.9)	Females
294 (32.1)	Males
<i>Age group, n (%)</i>	

477 (52.1)	20 to 30 years
155 (16.9)	31 to 40 years
135 (14.7)	41 to 50 years
122 (13.3)	51 to 60 years
27 (2.9)	Above 60 years
<i>Nationality, n (%)</i>	
852 (93.0)	Saudi
64 (7.0)	Non-Saudi
<i>The region, n (%)</i>	
330 (36.0)	Western Region
138 (15.1)	Eastern Region
190 (20.7)	Central Region
154 (16.8)	Northern Region
104 (11.4)	Southern Region
<i>BMI (kg/m²)</i>	
25.87 ±5.30	Mean ±SD
<i>Current job, n (%)</i>	
137 (15.0)	Student
136 (14.8)	Teacher
43 (4.7)	Sales officer
24 (2.6)	Nurse
18 (2.0)	Receptionist
8 (0.9)	Security guard
7 (0.8)	Chef
367 (40.1)	Unemployed
175 (19.1)	Other
<i>Past medical history, n (%)</i>	
101 (11.0)	Diabetes
93 (10.2)	Hypertension
72 (7.9)	Hypothyroidism
13 (1.4)	Hyperthyroidism
190 (20.7)	Anemia
124 (13.5)	Dyslipidemia
9 (1.0)	Cancer
22 (2.4)	Heart diseases
<i>Smoking status, n (%)</i>	
40 (4.4)	Ex-Smoker
112 (12.2)	Current smoker
764 (83.4)	Non-Smoker

SD = standard deviation, BMI= Body Mass Index.

The main source of participants’ knowledge about VVs’ symptoms, complications, risk factors, and prophylactic measures was social media (37.8%), and only 8.8% was from doctors, with an overall knowledge score of 72.97% (Table 2).

Table 2: Participants' knowledge about symptoms, complications, risk factors, and prophylactic measures of varicose veins (n=916)

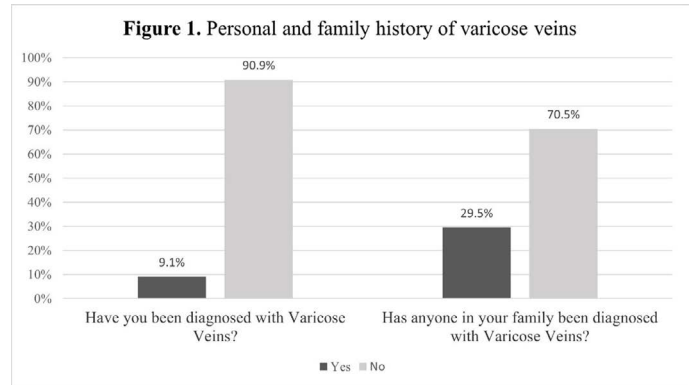
Percentage (%)	Frequency	Variables
What do you think are the symptoms of VVs?		
74.8	685	Leg pain and heaviness
74.1	679	Discomfort while walking
73.8	676	Swollen feet and ankles
53.8	493	Burning sensation in legs
45.6	418	Dryness and itching
68.9	631	Thinning of the skin over the affected veins
What do you think are the complications of VVs?		

81.3	745	Enlarged swollen legs
67.1	615	Skin color change
59.7	547	Hardening of tissues under the skin and eczema
44.7	409	Chronic skin ulceration
73.7	674	Blood clots (superficial phlebitis or thrombophlebitis) from large VVs
65.9	603	The veins too close to the skin may burst, causing bleeding
What do you think are the risk factors of VVs?		
70.0	641	Gender, VVs are more common in women
68.7	629	Age
74.5	682	Family history
84.8	777	Prolonged standing
84.6	775	Being overweight
81.0	742	Lack of physical activity
69.2	634	Pregnancy
76.9	704	Occurrence of thrombosis in superficial or deep veins of the legs
What do you think are the prophylactic measures against VVs?		
89.4	819	Avoiding standing for long periods
75.2	689	Avoiding sitting for long periods
86.1	789	Taking regular breaks throughout the day
83.2	762	Elevating legs on a pillow while resting
68.7	629	Avoiding sitting cross-legged
88.1	807	Exercising regularly
89.6	821	Maintaining a healthy weight
70.0	641	Wearing compression stockings
What is the source of your knowledge of VVs?		
18.9	173	Medical books and journals
11.4	104	VVs patient
5.1	47	Medical campaigns
8.5	78	Family member with VVs
8.8	81	Doctor
8.5	78	Friends/colleagues
37.8	346	Social media
1.0	9	Other

VVs = Varicose Veins.

When participants were asked about the symptoms of VVs, leg pain or heaviness (74.8%), discomfort while walking (74.1%), and swollen feet and ankles (73.8%) were the most frequently reported. Only 45.6% of the participants recognized leg dryness and itching as symptoms of VVs. Regarding knowledge of complications of VVs, chronic skin ulceration was the least reported complication (44.7%). The most recognized complications were enlarged swollen legs (81.3%), leg blood clots from large VVs (73.7%), skin color changes (67.1%), and bleeding from burst VVs (65.9%). Knowledge about the risk factors of VVs was also analyzed, and the most well-known were prolonged standing (84.8%), being overweight (84.6%), and a lack of physical activity (81%). In contrast, age (68.7%) and pregnancy (69.2%) were the least-known risk factors. Maintaining a healthy weight was the most cited preventive measure against VVs (89.6%), while 68.7% chose avoiding sitting cross-legged as a preventive measure.

Prevalence and associated risk factors of VVs: Figure 1 shows that 83 participants (9.1%) reported having been diagnosed with VVs, while 270 (29.5%) reported that at least one family member has VVs.



To determine the individuals' characteristics and lifestyles that could considerably raise the risk of developing VVs, the prevalence of VVs among the various subgroups was studied and compared, as shown in Table 3 and Table 4.

Table 3: Demographic factors impact the prevalence of varicose veins

P-Value	Total, (n)	No	Yes	Have you been diagnosed with VVs?
<i>Gender, n (%)</i>				
0.130*	622	559 (89.9)	63 (10.1)	Females
	294	274 (93.2)	20 (6.8)	Males
<i>Age group, n (%)</i>				
<0.001*	477	459 (96.2)	18 (3.8)	20 to 30 years
	155	137 (88.4)	18 (11.6)	31 to 40 years
	135	113 (83.7)	22 (16.3)	41 to 50 years
	122	104 (85.2)	18 (14.8)	51 to 60 years
	27	20 (74.1)	7 (25.9)	Above 60 years
<i>The region, n (%)</i>				
0.608*	330	302 (91.5)	28 (8.5)	Western Region
	138	127 (92.0)	11 (8.0)	Eastern Region
	190	169 (88.9)	21 (11.1)	Central Region
	154	143 (92.9)	11 (7.1)	Northern Region
	104	92 (88.5)	12 (11.5)	Southern Region

*Chi-Square, †Independent T- Test
VV= Varicose Veins

Table 4: Risk factors influence the prevalence of varicose veins

P-Value	Total, (n)	No	Yes	Have you been diagnosed with VVs?
<i>BMI (kg/m²)</i>				
<0.001†	916	25.65 ±5.22	27.98 ±5.64	Mean ±SD
<i>Comorbidities, n (%)</i>				
.388*	101	89 (88.1)	12 (11.9)	Diabetes
.021*	93	78 (83.9)	15 (16.1)	Hypertension
<0.001*	72	51 (70.8)	21 (29.2)	Hypothyroidism
.333*	13	11 (84.6)	2 (15.4)	Hyperthyroidism
.351*	190	169 (88.9)	21 (11.1)	Anemia
<0.001*	124	100 (80.6)	24 (19.4)	Dyslipidemia
.193*	9	7 (77.8)	2 (22.2)	Cancer
.442*	22	19 (86.4)	3 (13.6)	Heart diseases
<i>Smoking status, n (%)</i>				
.237*	40	34 (85.0)	6 (15.0)	Ex-Smoker
	112	105 (93.8)	7 (6.3)	Current smoker
	764	694 (90.8)	70 (9.2)	Non-Smoker
<i>Exercise minutes per week, n (%)</i>				

	159	145 (91.2)	14 (8.8)	More than 150 minutes
.863*	285	257 (90.2)	28 (9.8)	Less than 150 minutes
	472	431 (91.3)	41 (8.7)	I don't exercise
<i>Current job, n (%)</i>				
	137	134 (97.8)	3 (2.2)	Student
	136	111 (81.6)	25 (18.4)	Teacher
	43	41 (95.3)	2 (4.7)	Sales officer
	24	19 (79.2)	5 (20.8)	Nurse
<0.001*	18	16 (88.9)	2 (11.1)	Receptionist
	8	6 (75.0)	2 (25.0)	Security guard
	7	3 (42.9)	4 (57.1)	Chef
	367	334 (91.0)	33 (9.0)	Unemployed
	175	168 (96.0)	7 (4.0)	Other
<i>Number of daily working hours, n (%)</i>				
	596	536 (89.9)	60 (10.1)	4 to 8 hours
.018*	170	164 (96.5)	6 (3.5)	Less than 4 hours
	150	133 (88.7)	17 (11.3)	More than 8 hours
<i>The number of standing hours at work, n (%)</i>				
	628	591 (94.1)	37 (5.9)	1 to 3 hours
<0.001*	232	192 (82.8)	40 (17.2)	4 to 6 hours
	56	50 (89.3)	6 (10.7)	7 hours or more
<i>The number of sitting hours and rest at work, n (%)</i>				
	522	467 (89.5)	55 (10.5)	1 to 3 hours
.146*	296	273 (92.2)	23 (7.8)	4 to 6 hours
	98	93 (94.9)	5 (5.1)	7 hours or more
<i>Does your job require heavy lifting regularly? n (%)</i>				
0.001*	59	46 (78.0)	13 (22.0)	Yes
	857	787 (91.8)	70 (8.2)	No
<i>Has anyone in your family been diagnosed with VVs? n (%)</i>				
<0.001*	270	223 (82.6)	47 (17.4)	Yes
	646	610 (94.4)	36 (5.6)	No
<i>If you are a female, have you ever been pregnant? n (%)</i>				
<0.001*	256	204 (79.7)	52 (20.3)	Yes
	428	407 (95.1)	21 (4.9)	No
<i>If you are a female, have you received any hormonal treatment? n (%)</i>				
<0.001*	104	80 (76.9)	24 (23.1)	Yes
	590	540 (91.5)	50 (8.5)	No

*Chi-Square, †Independent T- Test

VV= Varicose Veins, SD = standard deviation, BMI= Body Mass Index.

The prevalence of VVs was higher in females (10.1%) than in males (6.8%). Participants aged above 60 years showed a statistically significant higher prevalence of VVs compared to other age groups (25.9%, $P < 0.001$), and that VVs' prevalence was lowest among participants aged 20 to 30 years (3.8%). Moreover, the mean body mass index (BMI) was significantly higher ($P < 0.001$) among the VV population (27.98 ± 5.64). Dyslipidemia ($P < 0.001$), hypothyroidism ($P < 0.001$), and hypertension ($P = 0.021$) were strongly associated comorbidities with the prevalence of VVs in our study sample. Teachers accounted for 30.1% of those affected by VVs, with a statistically significant higher prevalence of VVs in chefs (57.1%), security guards (25%), and nurses (20.8%) ($P < 0.001$). Higher daily working hours and standing hours were significantly correlated with the prevalence of VVs. Participants spending more than 8 working hours daily had a prevalence of 11.3% compared to 3.5% of people spending less than 4 hours working ($P = 0.018$). In addition, a prevalence of 17.2% and 10.7% in participants with standing hours at work of 4 to 6 hours and 7 hours or more, respectively, was noted. On the other hand, people with

1 to 3 standing hours at work had a VV prevalence of 5.9% ($P < 0.001$). Heavy lifting regularly was found to significantly affect VV prevalence; the rate among participants with jobs requiring heavy lifting was 22% ($P = 0.001$). Family history of VVs was also found to significantly affect the prevalence of VVs. The prevalence among participants who had a family member with VVs (17.4%) was significantly higher ($P < 0.001$) than that of participants who had no family history of VVs (5.6%). Females who had been pregnant or who had received any hormonal treatment in their lives showed a significantly higher prevalence of VVs (20.3% and 23.1%, respectively) ($P < 0.001$).

DISCUSSION

Knowledge and perception of VVs: Only 8.8% of the people included in this study had learned about VVs from doctors; instead, 37.8% chose social media as their main source of knowledge. Even though doctors are generally the best resource for knowledge, a rising number of individuals are turning to data they find online³¹. Despite a growing number of people looking online for information on VVs, the accuracy of this content is unconfirmed and highly variable. The general public should be informed of currently accessible online resources, and high-quality websites and those supported by the government should be suggested on all social media platforms.

When asked about the symptoms of VVs, participants most frequently mentioned leg pain or heaviness (74.8%), discomfort when walking (74.1%), and swollen feet and ankles (73.8%). Similar research revealed that among the participants, bluish lumps in the leg (54.6%), ankle and foot swelling (25.8%), and leg heaviness (22.9%) were the most commonly cited symptoms of VV²⁷. Another study found that worm-like tortuous venous masses on the lower limb surface are the most emblematic clinical manifestation of varicose veins³². Knowledge of the risk factors for VVs was also examined. The most well-known risk factors were extended standing (84.8%), being overweight (84.6%), and inactivity (81%). An earlier study with findings that corroborate our study's findings about the primary risk factors of VV found that prolonged standing was the most frequently reported cause (60.8%)²⁷. The most widely accepted preventive approach against VVs found in our study was to maintain a healthy weight and avoid standing for extended periods. Similar research revealed that 58.9% of individuals acknowledged minimizing prolonged standing as a preventative approach against VVs²⁷.

Prevalence of VVs and influencing factors: In the current study, only 9.1% stated that they had been diagnosed with VVs, while 29.5% reported at least one family member having VVs. Likewise, a Saudi study reported that 10% of their sample had been diagnosed with VVs, and 28.0% said that at least one family member had been diagnosed with VVs²⁷.

Regarding the prevalence of VVs among the various subgroups, our study showed that it is higher in participants aged above 60 years, with higher BMI, and people with multiple comorbidities such as dyslipidemia, hypertension, and hyperthyroidism. These results were consistent with previous studies showing a higher prevalence of VVs in participants aged above 55²⁷ and obese³³. In contrast, a study published in 2020 in Riyadh City showed that comorbidities such as hypertension and diabetes have not demonstrated a statistically significant association with VVs²⁹. This may be due to differences in the prevalence of chronic diseases among different regions in Saudi Arabia. In addition, in line with multiple previous studies, the current study found that females are at a higher risk of developing VVs compared to males^{27,29,33}. The hypothesis behind this association could be justified by a study showing that female sex hormones, progesterone, and estrogen can affect vascular smooth muscles³⁴.

As for working hours, this study ascertained that higher daily working hours and standing hours at work correlated significantly with the prevalence of VVs. Thus, participants spending more than eight daily working hours had a result of 11.3% compared to 3.5% of people spending less than four hours working. Our results were similar to those of Althobaiti et al., in which spending long hours standing at work was associated with a significantly higher prevalence of VVs²⁷. Additionally, the most frequently reported careers related to developing VVs in our study were teachers, chefs, security guards, and nurses. These results correspond with other previous studies that reported that teachers and nurses are high-risk populations for developing VVs^{27,29}. These jobs demand long hours of standing with limited time to engage in physical activities, which are confirmed risk factors for VVs. High rates can be lowered by managing other risk factors, improving lifestyle, decreasing hours of standing, and improving working conditions as much as possible.

Our study reported that a positive family history of VVs and females who had been pregnant or received any hormonal treatment showed a significantly higher prevalence of VVs (17.4%, 20.3%, and 23.1%, respectively). Also, jobs requiring heavy lifting were found to affect VV prevalence substantially. Correspondingly, two studies published in Brazil and Saudi Arabia concluded that old age, number of pregnancies, hormonal therapy, and positive family history of VVs were associated with the presence of the disease^{27, 35}. Another study also detected that lifting heavy objects and having a positive family history are risk factors for VVs²⁹. The theory about heavy lifting is that it affects the vena cava and restricts blood flow in the leg veins due to the extra pressure, leading to defective valve function, which induces VVs. The researchers recommended using machines instead, if possible, to decrease the likelihood of developing varicosity.

Limitation: The limitations in this study that warrant mention are that an online questionnaire was made available through social media websites and applications and used to gather the data. This may have constrained the accuracy and the likelihood that the survey would be complete and reliable. Additionally, participants' self-reporting statements about having VVs were not validated with a clinical assessment of their lower extremities or another reliable evaluation, which may affect the study's empirical results.

CONCLUSION

Our study population exhibited fair knowledge and awareness of VVs. However, the prevalence of VVs was significantly higher among people at risk, especially those with jobs requiring prolonged working and standing hours. Public efforts, including educational programs and campaigns, are recommended for the general population about risk factors and measures to help prevent the onset and progression of VVs, especially for higher-risk populations. Clearly, the prevalence of VVs can be reduced by improving the working circumstances of those who must stand for extended periods.

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Potential Conflicts of Interest: None

Competing Interest: None

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